

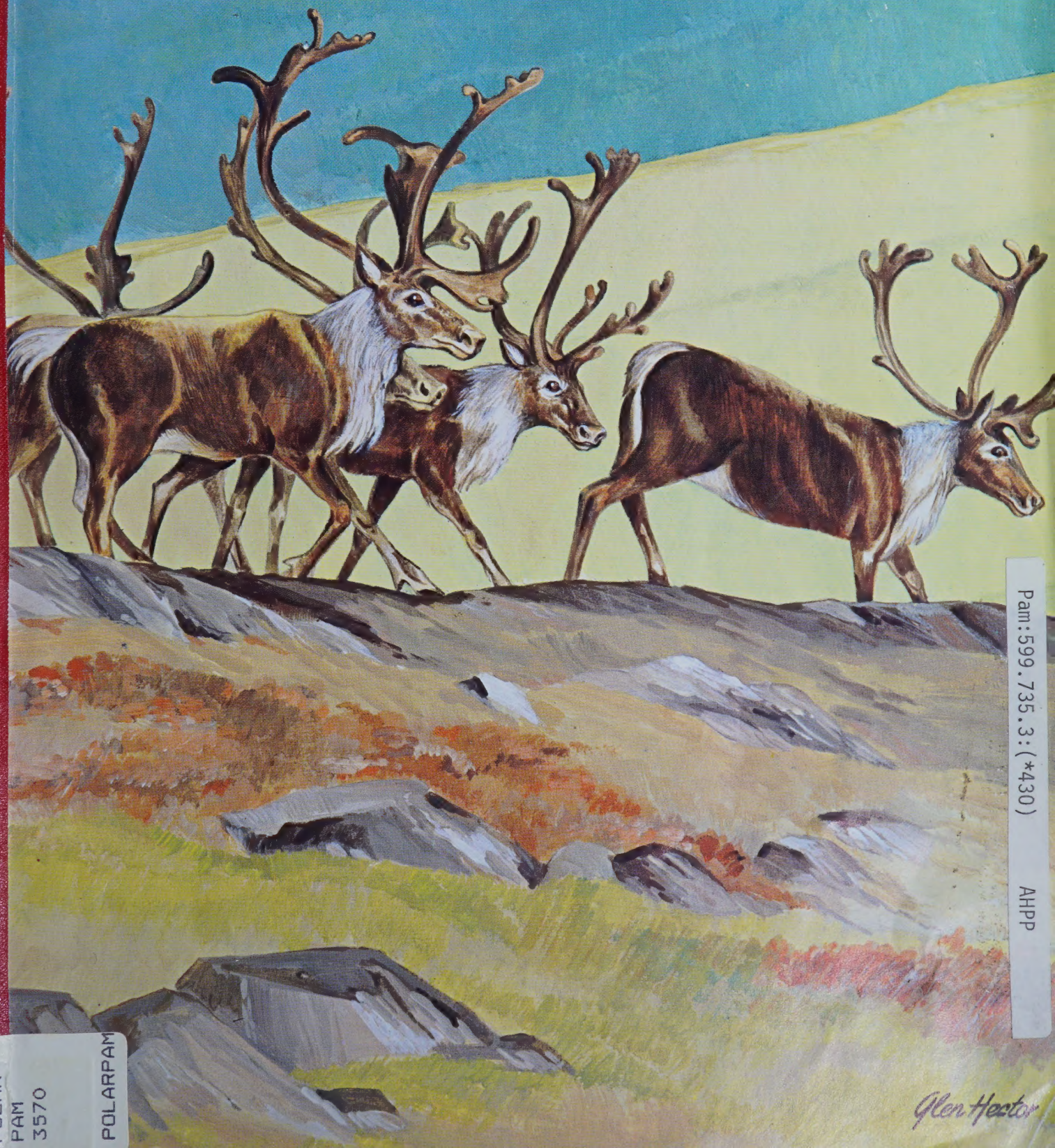
Highway Pipeline Panel

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# The Porcupine Caribou Herd and the Dempster Corridor



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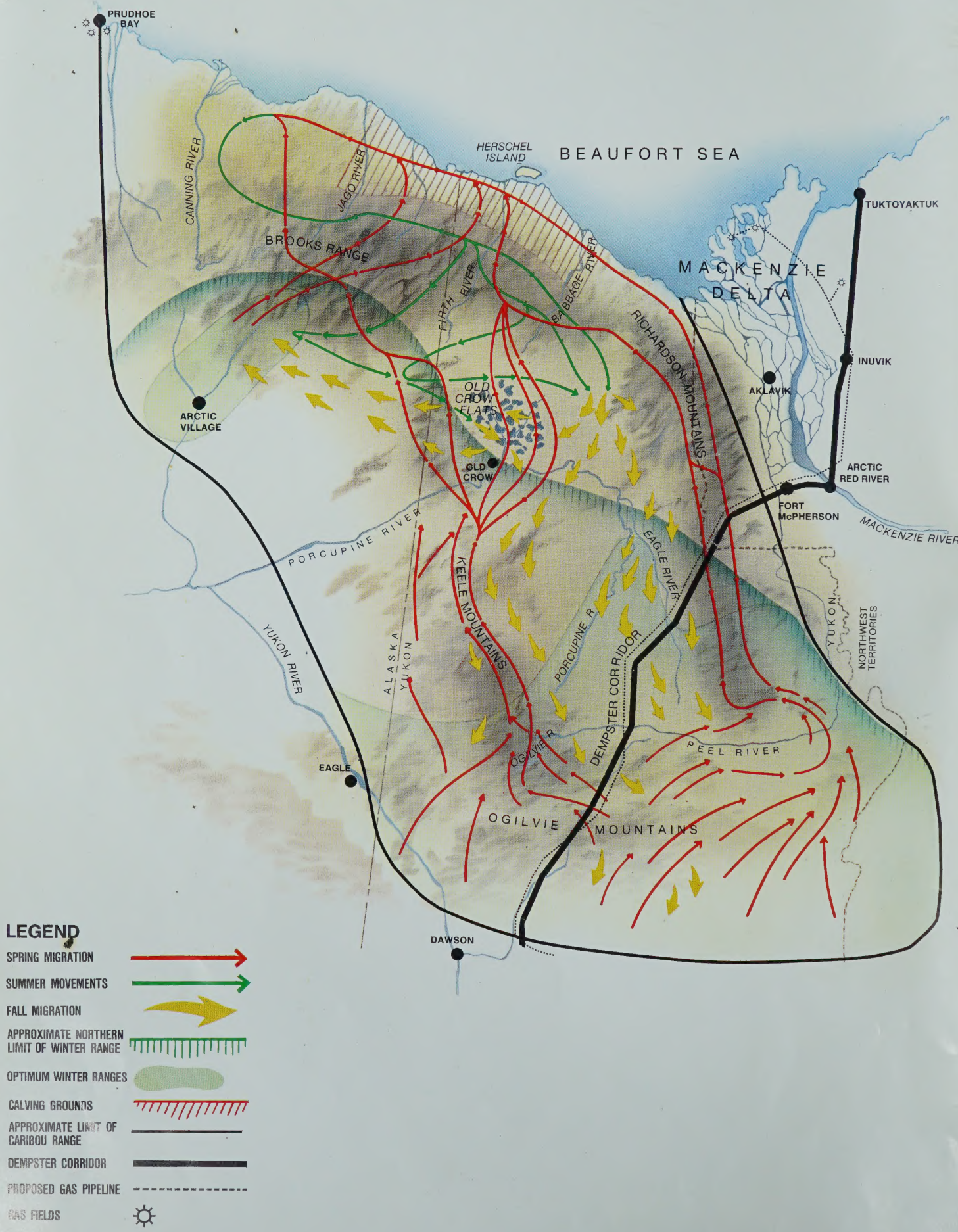
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- LEGEND**
- SPRING MIGRATION
  - SUMMER MOVEMENTS
  - FALL MIGRATION
  - APPROXIMATE NORTHERN LIMIT OF WINTER RANGE
  - OPTIMUM WINTER RANGES
  - CALVING GROUNDS
  - APPROXIMATE LIMIT OF CARIBOU RANGE
  - DEMPSTER CORRIDOR
  - PROPOSED GAS PIPELINE
  - GAS FIELDS



# The Porcupine Caribou Herd and the Dempster Corridor

## Introduction

The Alaska Highway Pipeline Panel has been concerned with the continued survival of the Porcupine caribou herd in the face of a Dempster Corridor across the range traditionally used by the herd.

On February 19, 1978, 13 caribou specialists listed on the back cover met in a workshop sponsored by the Alaska Highway

Pipeline Panel to examine what is known about the herd, and to discuss the state of international scientific knowledge about the impacts of highways and similar human intrusions on caribou populations. The participants applied their firsthand experience with the herd as well as with caribou populations in Scandinavia, Alaska and the USSR.

The Panel circulated a series of questions to the participants and then invited them to the workshop to discuss the answers. This booklet presents the questions that were raised and the answers that were devised. The answers represent the consensus of the workshop and do not necessarily reflect the views of each participant.

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## The Porcupine Caribou Herd

The Porcupine Herd of barren ground caribou is recognized as the most important renewable resource of the northern Yukon. For as far back as there is record, this herd has been large enough to provide the native people of the region with their basic needs for animal protein.

The herd ranges over an area of 250,000 km<sup>2</sup> from the Ogilvie Mountains in the central Yukon north to the Arctic coast, west into northeastern Alaska and east as far as the western foothills flanking the Mackenzie Delta. In recent years, it has been using the same summer and winter ranges as it used in the past. A study of the location of ancient caribou

corrals suggests that caribou movement patterns then were much as they are today.

Recent proposals to build one or more pipelines through the range of this herd have led to intensive studies of the herd. The present size of the herd has been estimated and many other facts have been gathered on the behavior of the animals and how they respond to various man-made changes in their environment.

The Porcupine caribou herd is important for the long-term well-being of the native people and also to southern Canadians as a valuable natural phenomenon. We must be concerned that any major

changes we impose on the herd's environment do not result in a decline in the size or productivity of the herd.

The herd is also an international resource, since it is used by native people in Alaska as well as in the Yukon and the Northwest Territories. Thus, we have an added responsibility to maintain its viability.

Of immediate concern is the possible consequence of the use of the Dempster Highway as a major transportation artery. The Dempster Highway, which is likely to be completed in 1979, crosses the winter range traditionally used by the herd, cutting off about one-third of its range.



# Questions and Answers

## 1. What is the present knowledge of the size of the herd and its productivity?

In 1977 the herd was estimated at about 105,000 animals of which 85,000 were at least one year old. This estimate was determined from aerial photographs of the post-calving herds and ground classification counts in summer and fall. The task is complicated and the confidence limits on this estimate are plus or minus 28,000 animals. A review of similar censuses taken over the last 6 years reveals no reliable evidence that the herd has changed in numbers. So far as we can tell, this indicates that new young animals (yearlings) are being added to the herd at about the same rate as animals are being

removed each year by natural hazards, predators and man.

## 2. What is the present annual increment of new animals (i.e. calves that have survived one winter)?

In 1977, the annual increment (recruitment) was 15% of the total herd over one year of age. The average rate of addition of yearlings over the last 6 years has been 10%. Because the herd is staying at about the same size this means that some 8,500 adult animals are being removed from the herd each year. Current estimates indicate that from 3,000 to 5,000 caribou are killed by man each year. This includes those shot and used as well as those wounded and lost. The remainder are lost to all other natural causes.

## 3. Is there evidence of changes in the range used by the herd, or of major immigration or emigration?

The evidence bearing on this question is inconclusive because of the nature and scarcity of early records. There is sufficient evidence, however, that a herd can increase greatly in size and subsequently move out of its range onto adjacent areas. For example, two caribou herds — one in the USSR and another in Ungava — now have densities two times and four times as high as the density of the Porcupine herd. Thus, the possibility of expansion of the Porcupine caribou herd must be considered in developing management plans for the herd.

## 4. What is the nature of the impact of a highway on a caribou population?

Three types of impact were identified:

- the physical obstacle presented by the road and the traffic moving on it,
- the disturbance factor, and
- exposure to increased killing.

The severity of the first two types of impact depends on several factors:

- a) In wooded areas, the disturbance is less than it is on tundra, high alpine terrain or open areas where long distance visibility is possible. But it is dangerous to generalize to specific cases because other factors are also involved.
- b) Females with young are much more susceptible than are adult males.
- c) The barrier effect is least on caribou during major migrations and greatest on those on less urgent migrations or feeding at random.
- d) Disturbance delays the animals, reduces the amount of time spent feeding, and increases their metabolic rate and thus the amount of energy



Caribou winter range in summer (top) and winter (bottom) showing open spruce forests, on the headwaters of rivers which arise in the Ogilvie Mountains in the central Yukon. In winter, the caribou dig down through snow up to 2 feet deep to feed on the ground vegetation which often consists of thick lichen mats (insert).

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Caribou on winter range in early spring. These animals are still in their winter coats, with their well developed manes. Their thick coats consist of hollow hairs which are excellent insulation. Even their noses are furred for protection.

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used by the animals. These physiological manifestations of disturbance are potentially serious to animals under any form of ongoing stress but the research to quantify this increase in energy needed has yet to be done for caribou.

- e) Caribou adapt quickly to noise that is not accompanied by movement.
- f) Roads are used not only by traffic but they are also frequently followed by low-flying aircraft during bad weather. This increases the disturbance impact on caribou.
- g) Dust raised by traffic greatly increases the apparent size of a moving vehicle.



Truck traffic along the Dempster Highway near Inuvik. Traffic like this will increase along the entire highway once it is completed in 1979, unless restrictions are imposed. Dust raised by moving traffic increases the apparent size of a vehicle and also carpets adjacent areas.

**What is the role of hunting in a population of caribou? In what ways will the Dempster Highway influence this?**

Hunting along a highway acts as a major disturbance to caribou. Under some circumstances, it can reinforce the barrier effect of the highway.

The Dempster Highway has already made the Porcupine herd more accessible to hunters and probably increased the kill. Unless special measures are taken, it is inevitable that the kill adjacent to the highway will increase.

We wish to emphasize that the data discussed in questions 1 and 2 lead to the conclusion that no increase in the average kill can be tolerated at this time.

**Are there known instances where a caribou population whose range has been crossed by a highway has maintained its numbers?**

No.

**7. Are there known instances where a caribou population whose range has been crossed by a highway has recovered following a decline?**

The Nelchina herd in Alaska is reported to be increasing under complete protection from hunting.

**8. Can the proposed highway be managed in such a way that it will not contribute to a decline in the numbers of the Porcupine caribou herd?**

The most important point to emphasize in addressing this question is that the herd, in its present ecological setting, is at a point of balance. Available data will not permit us to say whether it is slowly increasing or decreasing. But if the herd is to continue to supply the native users with the food resource they depend on, nothing must be done which will increase the number of animals killed each year or decrease the



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Indians skinning a caribou killed while crossing the Porcupine River during fall migration. Caribou are killed by natives of Old Crow during both spring and fall migrations but more are taken in fall when the animals are fatter and in prime condition after a summer's feeding on the coastal plain and mountain foothills. About 3,000 to 5,000 animals are killed annually by people based at Old Crow in the Yukon, Arctic Village and Kaktovik in Alaska and Aklavik and Fort McPherson in the Northwest Territories. Sports hunting has recently increased along the Dempster Highway north of Dawson.

rate at which new arrivals reach breeding age.

This places severe limitations on the use of the herd. Native people should not increase their kill; if they need more meat, they should obtain it by reducing any crippling losses and wastage of animals they have killed. Sports hunting will probably have to be discontinued until the herd shows definite signs of growing. Tourists and other non-consumptive users must refrain from any activities which will increase disturbance of the herd. In particular, tourist activity should be excluded from the calving grounds during the calving periods.

Any plans for managing the Dempster Highway must take into account three possibilities. The highway could be: 1) used as a traffic artery only, 2) as a traffic artery with a gas pipeline close by, and 3) as a pipeline haul road only, and not as a transportation corridor.



The first possibility is the most immediate of the three since traffic is already using completed sections of the highway. As a result the people of the Mackenzie Delta now have increased access to the caribou. This has apparently resulted in an increase in the numbers of caribou they kill. Caribou have also been killed along the highway north of Dawson.

The workshop defined four major sources of impact on the caribou arising from the highway alone:

- a) The highway can have a barrier effect as a result of high berms, snow plowed off the road and piled alongside it, and lateral ditches filled with snow. These barriers can obstruct the free passage of caribou but their effect was regarded as least likely to be detrimental to the herd.
- b) The passage of vehicles can disturb caribou trying to cross the highway. In open terrain this can be most disruptive, especially to cows and calves. This disturbance can have several destructive impacts as outlined in question 4.
- c) Caribou can be killed in collisions. This is known to be a serious hazard wherever highways cross wildlife ranges. It is particularly serious in winter when wildlife may find it easier to move along the plowed road surface flanked by walls of snow, as is observed in Banff National Park. The effects are greater in timbered or brushy areas and at night.
- d) The highway can increase access to the herd and can thus increase hunting success. Frequently, it leads to hunting from automobiles by people too lazy or incompetent to hunt on foot.

Each of these concerns must be addressed and eliminated as a hazard to caribou if the road is to be used by traffic without threatening the continued survival of the Porcupine caribou herd in the Yukon.



*A section of the Dempster Highway exhibiting a high profile right-of-way. Note the presence of caribou tracks in the foreground and their absence on the opposite side of the road. High berms like this along with snow plowed off the road, or lateral ditches filled with deep snow can obstruct the free passage of caribou.*

The second possibility is that the Dempster Highway might be used as a traffic artery with a gas pipeline close by. A buried gas pipeline where the landscape has been restored to grade will present little if any inhibition to the passage of caribou across it. Experiments performed during research for the Mackenzie Valley pipeline revealed that migrating caribou paid little attention to the noise of a compressor station. Highway travel, associated maintenance, and the low-level flights for line surveillance will be the major sources of disturbance. Each of these will be cumulative and in addition to the impacts resulting from the highway alone. During construction of the pipeline, effort should be made to concentrate the haulage and construction as much as possible during the summer period when the caribou are out of the area. Other constraints such as nearby peregrine falcon nests and terrain sensitivity will have to be determined in scheduling construction. If a second haul road is required along part of the route this too will induce a cumulative effect.

The third possibility is that the Dempster Highway would be used as a haul road only and closed to other traffic. This would have the least impact on the caribou herd.

#### **9. What are the minimum elements of a highway management plan likely to have acceptable levels of impact upon the caribou?**

The workshop addressed the matter of a possible management plan for the highway which might meet the constraints indicated above. This would include:

- a) Free use of the highway from June 1 to October 1, and complete closure of the highway to all but emergency traffic from October 1 to May 31 — the period through which the caribou are likely to be crossing the highway or feeding near it. This is the preferred alternative.
- b) Closure during active migration of the caribou across the highway and a convoy system for traffic during periods when the animals are in the vicinity of the road but not actively migrating. This convoying system will require an active contact with the movement of caribou on at least a daily basis.
- c) Prohibiting hunting by anyone within 5 miles on either side of the highway.

Each of these alternatives will probably require that the highway



be designated as a special management area and not declared a public highway. This will be necessary if adequate controls over its use are to be imposed.

There is no reliable information to support the convoy alternative. Data are needed on the impact on caribou of vehicles travelling at different speeds, in convoys of different lengths, and with different spacing between convoys. Data are also needed on locations where caribou are most likely to be present under defined circumstances and on how the animals respond to traffic under different conditions of cover, visibility, etc.

It is not certain that plans for managing highway use outlined here will be successful in eliminating increases in the destructive impact on the herd. Careful monitoring will be necessary to determine the long-term cumulative impact.

The issue, as we see it, is further complicated by our misgivings about the long-term enforcement of the kinds of restrictions we have discussed above. If it is not possible to enforce traffic controls and completely prohibit hunting along the highway, we regard it as almost certain that the herd will decline.

#### **0. What are the elements of an adequate monitoring and research program?**

With the herd apparently at the stability point and the numbers of native people increasing, it is urgent that an annual census of the herd be undertaken using repeatable techniques. In addition to overall numbers, as well as the age, sex, and distributional data required to arrive at the population size, it is important that the annual recruitment to the adult herd be measured.

Data are lacking on the impact of wolves on this herd of caribou. Indeed, there is no research study anywhere on wolf biology and wolf-caribou interaction where the wolves are living on a migratory population of caribou. It is impor-

tant that these data be obtained. Grizzly bears and eagles may at times also be important predators on young calf caribou; the role of these predators should also be studied.

In view of the disturbance introduced by the hunting of caribou from snowmobiles, research should be planned, possibly in cooperation with Alaskan biologists, to compare rates of mortality, fecundity, and recruitment in a population hunted by snowmobile and by dog team or on foot.

An important loss of young caribou occurs during the first 4 months of life. Its causes are imperfectly known. The information could be useful to the design of management strategies.

Techniques are now available to measure the physiological drain on an animal that results from disturbance. This drain may induce mortality under some circumstances. It would be useful to gain insight into this factor.

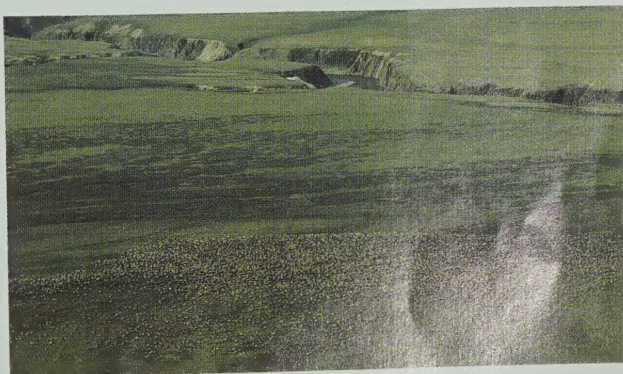
In view of these many uncertainties, management strategy must be most conservative.

## **Conclusion**

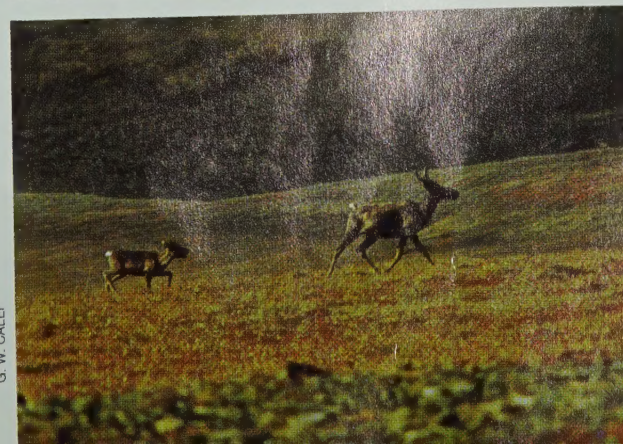
The migration of the 100,000 strong Porcupine caribou herd is one of the great natural phenomena in Canada. The relationship of the native people with caribou for 28,000 years in the northern Yukon has a cultural significance that goes far beyond the monetary value of the animals as meat and hides.

This workshop came to the conclusion that annual recruitment to the herd just about equals the herd's death rate at the present time. Opening the highway to the public and construction of a gas pipeline will tend to cause the herd to decline unless special management techniques are put into effect. The conservation of the herd, therefore, becomes a question of whether we, as a people, can and will manage man's activities to prevent a decline in the herd.

Although the herd can probably be conserved, we are not sure that the Canadian Government, the Territorial Governments and the Canadian people will put out the money and effort to do so.



*A portion of one of the huge post calving herds. After the calves are born and the bulls have arrived on the Yukon coast, the caribou begin to drift together into larger and larger groups. During July, these groups coalesce into aggregations containing 50,000 and more animals. At this time the herds can be photographed from the air to determine the size of the entire population.*



*During the first few days after birth, the cow and calf form a strong bond of mutual recognition. Throughout the summer, the calf will follow the cow. If they are separated, they will find each other, even in the huge post calving herds.*

G. W. CALEF

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## Workshop Participants

This booklet reports the findings of a workshop of the 13 caribou specialists listed below. The workshop was sponsored by the Alaska Highway Pipeline Panel. The views expressed in this booklet are the consensus of the workshop and do not necessarily reflect the individual views of the participants.

*Dr. Ian McTaggart-Cowan*, Professor of Zoology and Dean Emeritus of Graduate Studies, University of British Columbia — Workshop Chairman.

*Mr. W. Winston Mair*, Consultant, Environment, Land Use and Indian Socio-Economic Development—Workshop Secretary

*Ms. Lorraine Allison*, Canadian Arctic Resources Committee and consultant to Council for Yukon Indians.

*Dr. Tom Bergerud*, University of Victoria,

*Dr. George W. Calef*, Fish and Wildlife Service, Government of the Northwest Territories.

*Dr. Valerius Geist*, Professor, Faculty of Environmental Design, University of Calgary.

*Dr. M. Hoefs*, Assistant Director of Game, Yukon Wildlife Branch, Government of Yukon Territory.

*Dr. John P. Kelsall*, Canadian Wildlife Service, Delta, B.C..

*Dr. David R. Klein*, Leader, Alaska Co-operative Wildlife Research Unit, University of Alaska, Fairbanks.

*Mr. Frank L. Miller*, Canadian Wildlife Service, Edmonton.

*Mr. D. G. Roseneau*, Renewable Resources Consulting Services, Fairbanks.

*Mr. J. Russell*, Yukon Wildlife Branch, Government of Yukon Territory.

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## The Alaska Highway Pipeline Panel

The Alaska Highway Pipeline Panel was established in August 1976 to study and report on the physical, biological and human environmental implications of construction and operation of the proposed Alaska Highway gas pipeline in the Yukon Territory. The Panel's purpose is to see to it that a reasonable degree of environmental protection is achieved during the planning, implementation, and eventual shutdown of the Alaska Highway gas pipeline, rather than simply make recommendations towards that end. Although sponsored by Foothills

Pipe-Lines Ltd., the Panel is autonomous and its views are not necessarily shared by Foothills.

The Panel is composed of:

*Mr. Irving K. Fox*: Research Associate, Westwater Research Centre and Professor of Regional Planning, University of British Columbia.

*Mr. W. Winston Mair*: Consultant; Environment, Land Use, and Indian Socio-Economic Development.

*Dr. Ian McTaggart-Cowan*: Professor of Zoology and Dean Emeritus of Graduate Studies, University of British Columbia.

*Dr. J. Gordon Nelson*: Professor of Geography and Dean of Environmental Studies, University of Waterloo.

*Mr. Carson H. Templeton*: Chairman, Alaska Highway Pipeline Panel and partner of Templeton Engineering Company.

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